

REMARKS***Claim Rejections – 35 USC § 103***

The Examiner considered claims 1 to 4, 7, 9-10 and 13 as being unpatentable over WO 01/00352 in view of Yanagimoto et al. The Examiner stated that WO'352 fails to teach the use of a first gas conduit position at the corner of the shoulder and cavity wall. However, the Examiner went on to say that Yanagimoto et al. teaches a first gas conduit at the corner of the shoulder and cavity wall for the purpose of feeding gas into the mold and generating a metal-free pocket. The Examiner therefore maintained that it would have been obvious to provide the apparatus of WO'352 with a first gas conduit position at the corner of the shoulder and cavity wall as taught by Yanagimoto et al.

It is noted that the Examiner considered the arguments submitted in a previous response to be unpersuasive for the apparatus claims because the prior art of WO'352 provides conduits 10 and 11 wherein one of them can be appropriately or with exchanged order and used as a gas line in the claimed apparatus.

It is certainly true that WO'352 provides conduits 10 and 11, one of which is used for gas and the other of which is used for lubricant. However, for the reasons given in the previous response, it appears that only conduit 11 is used for gas because bore 29 is positioned downstream of conduit 11 to allow for the escape of gas. If lubricant were supplied through conduit 11, not only would there be no provision for the escape of gas, but presumably lubricant would flow through bore 29 and therefore out of the system. Consequently, it does not seem logical that there could be an intention to supply lubricant through conduit 11.

In any event, WO'352 discloses only two conduits, one for gas and one for lubricant. On the other hand, Yanagimoto et al. discloses the delivery of gas into the shoulder of the mold and suggests that such delivery can be used with conventional casters of the type mentioned in column 3, line 45 to column 4, line 37. If a person skilled in the art were to consider combining Yanagimoto et al. with WO'352, surely this would merely involve the introduction of a reactive gas through conduit 11 of WO'352 because conduit 11 already feeds into the shoulder region or corner of the mold. Even if the Examiner's assumption is correct, i.e. that the gas and lubricant feed in WO'352 can be reversed, thereby supplying lubricant through conduit 11 and gas through conduit 10, there is no longer any space for the introduction of a separate gas feed into the shoulder or corner region of the mold, because this is already occupied by the lubricant feed. The only way that the suggested combination could take place in such circumstances would be to move conduit 11 (when used for lubricant

supply) to a different location, while retaining conduit 10 (for gas feed) and also providing an extra conduit for gas feed directly into the corner of the mold. However, there is no direction as to how this modification could be made. Moreover, given the clear alternative of feeding the reactive gas through conduit 11 (and lubricant through conduit 10), there would be no reason to consider such a modification.

In summary, a person skilled in the art, even if motivated to combine the teaching of WO'352 and Yanagimoto et al. would have no reason to provide apparatus containing two gas feeds in addition to a lubricant feed.

For this reason, it is believed that claims 1 to 4, 7, 9-10 and 13 should be considered patentable. The Examiner rejected claims 5 and 6 as unpatentable over WO'352, Yanagimoto et al. and further in view of Thoenton. However, claims 5 and 6 depend from the claims discussed above and at least for that reason should be considered patentable over the combination suggested by the Examiner. The Examiner rejected claims 8 and 33 as being unpatentable over WO'352 in view of Yanagimoto et al. and further in view of Kudo et al. and McGee et al. Claim 8 is dependent from claim 1 and is therefore believed to be patentable over the combination of prior art suggested by the Examiner for the same reasons as claim 1.

Claim 33 is an independent claim directed to a mold. The claim requires (amongst other things) means for controlling the amount of lubricant being fed to the mold cavity comprising detectors located to measure the electrical resistance between the mold cavity wall and molten metal present in the mold during casting, the electrical resistance being indicative of the amount of lubricant in contact with the metal.

As noted in the previous response, Kudo et al. discloses a sensor for detecting the presence of low molecular weight hydrocarbon using a conductivity-based sensor. The sensor comprises a conductive polymer coating and is not based on measurement of resistance between a solid surface (e.g. a mold wall) and molten metal or an emerging ingot. The field of this patent is totally remote from the field of the present invention. There is no suggestion in this reference that one could use the sensor in the environment of a casting mold. Consequently, a person skilled in the art would not even consult Kudo et al. and would not identify it with the sensing of a lubricant with the sensing of a lubricant as required in claim 33. Reconsideration is therefore requested.

The Examiner rejected claim 11 over WO'352 in view of Yanagimoto et al. and further in view of Ohno. However, claim 11 is a dependent claim (dependent from claim 1) and is therefore believed to be patentable at least for the same reasons as claim 1.

The Examiner rejected claim 12 in view of WO'352 in view of Yanagimoto et al. and further in view of Kittilsen. Claim 12 is a dependent claim (dependent indirectly on claim 1) and is therefore believed to be patentable at least for the same reasons as claim 1.

The Examiner rejected claim 14 as unpatentable over WO'352 in view of Yanagimoto et al. and further in view of Foye et al. Claim 14 is indirectly dependent on claim 1 and is therefore believed to be patentable at least for the same reasons as claim 1.

The Examiner rejected claims 34 and 35 as anticipated by or, in the alternative, obvious over Flowers et al. Claims 34 and 35 relate to a cast aluminum or aluminum alloy billet having a uniform cast microstructure with an average inter-dendritic arm spacing of less than 10 microns (claim 34) and having a surface roughness of less than 50 microns (claim 35).

The Examiner stated that Flowers et al. discloses a cast alloy having a fine grain structure with smaller than 1 micron dendritic arm spacing (column 8, lines 65 plus). However, this part of the reference appears to mention only "a fine grain structure with small dendritic arm spacing" (column 8, lines 67 and 68). It is also to be noted that the product of the invention of Flowers et al. is produced by twin-roll casting rather than direct-chill casting as in the present invention. Accordingly, claim 34 of this application has been amended to refer to direct-chill (DC) casting. Clearly, the product of Flowers et al. is different in both method of structure and product properties than the billet of the present application.

It is noted with appreciation that claims 15 to 32 are allowed.

For foregoing reasons, it is believed that this application is now in condition for allowance. Favorable action thereon is accordingly courteously requested.

Respectfully,

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I hereby certify that this paper is being deposited this date with the U.S. Postal Service as first class mail addressed to Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

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Date JUNE 24, 2005